THE DEVONIAN LIMESTONES OF CENTRAL OHIO AND SOUTHERN INDIANA.

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A comparative study of the two regions, lying on opposite sides of the Cincinnati island, shows that there is a remarkable similarity between the Devonian limestones of central Ohio and southern Indiana. This is perhaps more evident from a lithological point of view although the paleontology of the formations of the two places is very similar and the stratigraphic arrangement is identical.

These deposits in Ohio have been divided into the Columbus and Delaware limestones. The Columbus presents two very different lithological phases which are persistent throughout the state. In southern Indiana Dr. Edward M. Kindle has recognized three distinct formations, the Geneva and Jeffersonville limestones and the Sellersburg beds,[1] the latter including the Silver Creek hydraulic limestone of some authors.

The lower of these Indiana formations, stratigraphically, is the Geneva limestone which "is generally a massive light buff to chocolate brown saccharoidal magnesian limestone" in which "fossils are extremely rare at most locations and occur usually as casts when found."[2] It thins out toward the Ohio river but may be seen in the vicinity of Charleston, along the hill above the "Lick" and at the road side east of town.

In Ohio the lower thirty-five to forty feet of the Columbus limestone answers admirably to the above description. It is usually a porous brown limestone high in its percentage of magnesium carbonate. The bedding is irregular and frequently almost wanting. Oblique jointing, although not necessarily characteristic, is common. It contains but few fossils all of which are usually but poorly preserved, existing mostly as moulds with occasional casts. Bituminous matter is also usually found, either as thin films between layers or within the rock itself causing an irregular banding. Pockets of calcite crystals are often found and occasionally some gray chert.

The upper sixty-five or seventy feet of the Columbus limestone is usually a crystalline gray limestone high in its percentage of calcium carbonate. It contains great numbers of excellently preserved fossils and considerable gray chert which is also quite fossiliferous. The limestone occurs in even beds which vary from comparatively thin to massive layers. The lower part of this

1. Twenty-fifth Annual Report of the Department of Geology and Natural Resources of Indiana. (1900), pp. 533-536.

2. Ibid. pp. 535, 536.

portion of the formation in central Ohio includes a fossil coral reef which is frequently very pronounced.

The corresponding formation in southern Indiana is the Jeffersonville limestone which agrees so closely in appearance with the upper portion of the Columbus limestone that specimens taken from the Speed quarries near Sellersburg Indiana could not be distinguished from samples taken from the quarries at Marble Cliff. This identity is not merely lithological but extends also to the fossil content. The abundant species of the two limestones are the same and even some of the zones known here in Ohio [Spirifer acuminatus (Conrad), Spirifer gregarius Clapp, coral, etc.] can readily be located. The coral zone or fossil coral reef at Jeffersonville is on a far grander scale than the similar zone known in the Columbus limestone but it seems to occupy the same horizon or so nearly the same as to suggest that they may have been contemporaneous and probably formed portions of a great barrier reef of the Devonian Sea along the shores of the Cincinnati island.

At the Falls of the Ohio the Geneva limestone has thinned out so that the Jeffersonville becomes the lowest formation of the Devonian and rests directly upon the Louisville limestones (Niagara) of the Upper Silurian.[3] Some writers have included the Geneva with the Jeffersonville limestone on the same ground that the lower portion of the Columbus limestone is retained with the upper in the same formation, viz.: identity of fossil content.

The greatest deviation from a nearly perfect identity is to be found between the Sellersburg beds and the Delaware limestone, and yet even here there is that element of similarity which is so evident in the lower deposits. The Sellersburg beds as seen in the quarry of the Standard Cement Company two miles northwest of Charleston, Indiana, along the Baltimore & Ohio Railroad consists of a rather soft blue marly limestone with some shaly layers where much weathered. This portion includes rather more than half of the outcrop. Above this comes a very fossiliferous gray limestone with much soft chalky white chert giving it a mottled appearance. And finally above this comes about two feet of very cherty fossiliferous limestone. Where this formation is not covered by the New Albany black shale the upper part has weathered into a red mud leaving its fossils, many of which are silicified, in a free condition and well preserved.

The Delaware limestone which, from its similarity of fossils and stratigraphic position, corresponds in a general way to this Indiana formation, is too variable to compare favorably distant sections even in Ohio, but its cherty character, blue color, and

3. Ibid. p. 535.

often argillaceous composition as well as the red muds, resulting from extensive weathering, suggest similar conditions of deposition. The approximate correlation of these deposits is then as follows:

INDIANA.	OHIO.
Sellersburg beds	Delaware limestone
Jeffersonville limestone Geneva limestone	Columbus limestone

Northward in both states the line of division between these formations becomes less distinct and in the northern part of the southern Indiana area Dr. Kindle remarks that "associated with the loss of individuality of these two formations occurs a mingling of their two faunas which renders them indistinguishable as separate faunas."[4] To a very limited extent the same is true in Ohio where we find species belonging to the Columbus limestone of central Ohio well up in the Delaware of the northern part, but the preponderance of Hamilton species in the upper formation is even greater in northern than in central Ohio.

The full meaning of these similarities is rather hard to state definitely but they certainly indicate contemporaneous deposition and more or less open communication during their formation, and that the sea bordering the eastern shore of the Cincinnati land area was not essentially different from that which washed the western shore of the same.